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Review Article

Pulsed Radiofrequency Of The External Nasal Nerve For External Nasal Neuralgia.

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Abstract

Introduction: External nasal neuralgia is a significant yet rare cause of facial pain. This pain can arise from various central and peripheral etiologies. Due to its complex pathophysiology, it is often overlooked and misdiagnosed. Various treatment options are available for managing this pain, including pharmacological and interventional therapies. Its rarity and the lack of standard treatment options make this condition particularly significant. In our experience, an effective treatment approach must take into account both local inflammatory factors and abnormal nerve modulation. In this study, we aimed to evaluate the effect of pulse radiofrequency (PRF) treatment on pain intensity and the dose of analgesics used in patients diagnosed with external nasal neuralgia.

Method: In this study, a total of 8 patients were examined, comprising 1 patient with a history of trauma and 7 without any history of trauma, all of whom presented with pain in the nasal and perinasal regions. Data on the patients' age, gender, pain localisation, visual analogue scale (VAS) score at the time of clinic visit, and VAS scores at weeks 4 and 12 following pulse radiofrequency (PRF) treatment, as well as the doses of opioid and adjuvant medications used, were recorded.

Results: A total of 8 patients were included in the study, comprising 50% women and 50% men. The patients' VAS scores at the time of initial presentation were found to be 8,16±1,18 on average. The mean VAS scores at weeks 4 and 12 post-treatment were 1.96±1.12 and 2.00±1.07, respectively; statistically significant differences were found compared to baseline pain ($p < 0.001$, $p < 0.001$). Regarding systemic analgesic treatment; patients using tramadol , pregabalin , gabapentin , duloxetine and amitriptyline were observed to have a significant reduction in the doses required for pain control during post-procedure follow-ups.

Discussion: In patients with pain, significant clinical improvement was achieved by applying pulsed radiofrequency to the external nasal nerve in addition to first-line neuropathic pain treatment (one patient received both sphenopalatine and external nasal nerve PRF, whilst another patient received Gasser RF ablation and external nasal nerve PRF). Pulse radiofrequency (PRF) treatment is considered an important treatment option due to its low risk of side effects (as it is not a neuroablative treatment), the patient's avoidance of side effects associated with the systemic medication load, and its distinct mechanism of action. It has been observed that pulse radiofrequency (PRF) treatment, when applied to patients with neuropathic pain associated with external nasal neuralgia, is effective in the short and medium term in terms of both pain intensity and the need for systemic medication.

Keywords: External nasal neuralgia, Pulse radiofrequency, Visual analogue scale, Neuropathic pain.

INTRODUCTION

External nasal neuralgia is a rare and complex syndrome characterised by atypical facial pain, with only a limited number of cases reported in the literature. Various central and peripheral mechanisms are thought to be responsible for its etiology. Due to clinical and pathophysiological factors, difficulties are often encountered in establishing an accurate diagnosis and classification.

The diagnosis of facial pain relies, first and foremost, on a detailed and careful medical history; physical examination findings are often absent or non-specific. Neuralgic pain is confined to the distribution of the affected nerve. The patient's history, the localisation of the pain, and its resolution following the application of a peripheral nerve block are features that aid in diagnosis(1).

The nasal region is densely innervated by numerous terminal branches of the ophthalmic and maxillary nerves. In particular, the nasociliary nerve—a branch of the ophthalmic nerve—divides into the infratrochlear nerve and the anterior ethmoidal nerve. The infratrochlear nerve innervates the lateral portion of the radix nasi and the proximal part of the nasal dorsum; whilst the external nasal nerve, which originates from the anterior ethmoidal nerve, innervates the distal part of the nasal dorsum, the ala nasi and the apex nasi. In addition, the infraorbital nerve, which originates from the

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maxillary nerve, innervates the lateral part of the ala nasi, whilst the anterior superior alveolar nerve innervates the columella (2).

Clinically, nasal pain may be sharp or dull, paroxysmal or constant, short- or long-lasting, and superficial or deep in nature. It may also be accompanied by neuropathic symptoms, whether positive or negative. It may develop spontaneously or following trauma; it may begin immediately after the trauma, or it may develop weeks or even months after a mild trauma. The etiology of the idiopathic, non-traumatic form remains unclear; however, the failure of intranasal vasoconstrictors and anaesthetics to relieve the pain suggests that external nasal neuralgia involves a central pathophysiological process. According to a theory proposed regarding the etiology of centrally derived pain, stimulation of the peripheral branches of the trigeminal nerve leads to the activation of the caudal trigeminal nucleus in the brainstem, ultimately resulting in pain (3).

In the idiopathic form, diagnostic investigations—including brain magnetic resonance imaging and computed tomography of the sinuses—usually yield negative results. In the treatment of this rare condition, very few patients respond to tricyclic antidepressants and gabapentinoids. Some patients, however, respond to local anaesthetic block of the external nasal nerve, sphenopalatine ganglion block and radiofrequency ablation (3,4).

The differential diagnosis of these painful condition includes nasal septal anomalies, trigeminal neuralgia, trauma, rhinosinusitis, allergic reactions, ethmoid neuralgia, nasociliary neuralgia, intranasal tumours, Wegener's granulomatosis, nasal polymorphic reticulosis, septal haematoma, or trigeminal autonomic cephalalgias (TACs) (5–7).

In this study, we aimed to evaluate the effect of pulse radiofrequency (PRF) treatment on pain intensity and the dose of analgesics used in patients diagnosed with external nasal neuralgia.

MATERIALS AND METHODS

The study was conducted retrospectively at the Pain Clinic of ..... Hospital following approval by the Ethics Committee (No. .....-....). The study included patients who presented to the algology outpatient clinic between January 2018 and November 2025 with a diagnosis of external nasal neuralgia and a history of PRF)treatment.

Data recorded during routine outpatient follow-ups of patients who underwent PRF treatment—including age, gender, pain location, the visual analogue scale (VAS) PRF as well as data on the doses of opioid and adjuvant medications used at baseline and weeks 4 and 12, were retrospectively retrieved and recorded.

Procedure

Patients were first given local anaesthesia using an intranasal lidocaine spray; patients who did not respond to oral local anaesthesia were included in the study. Prior to the application of PRF, an intravenous line was established and vital parameters (pulse, temperature, blood pressure, oxygen saturation) were monitored to confirm they were within optimal ranges. Subsequently, using a radiofrequency cannula, the external nasal nerve was entered at the junction of the os nasale and the lateral nasal cartilage, approximately 6–7 mm lateral to the nasal bridge (8), sensory feedback was used to confirm that the needle was precisely in the correct position, and 0.5 mL of 0.5% bupivacaine was injected. In patients who achieved a near-complete response to the local anaesthetic, 6-minute PRF was applied a few days later. Six patients received PRF to the external nasal nerve; one patient received PRF to both the sphenopalatine nerve and the external nasal nerve; and in one patient, due to the presence of both trigeminal V3 neuralgia and external nasal neuralgia, Gasser RF ablation and PRF to the external nasal nerve were performed. No adverse effects were observed in the patients either during or after the procedure.

RESULTS

At our clinic, a total of eight patients—50% female and 50% male—who had been diagnosed with external nasal neuralgia and received PRF treatment were evaluated.

The mean age of the patients participating in the study was found to be 59.4 ± 14.1. Two patients with a history of trigeminal nevralgia in addition to external nasal nevralgia had previously undergone radiofrequency treatment of the Gasser ganglion in previous years, and neither patient had derived significant benefit from this treatment. In 4 of our patients, the pain was located along the right external nasal nerve tract; in 2, along the left external nasal nerve tract; in 1, along the left external nasal and right V3 nerve tracts; and in 1, in the bilateral paranasal region.

The pain may be episodic, accompanied by a tingling sensation lasting up to 30 minutes, occurring two to three times a day; however, in some patients, there may be a constant burning sensation accompanied by mild to moderate pain. As in most cases reported in the literature (2,3), the pain was of a constant nature in five of our patients, whilst three presented with an intermittent course (9). The duration of pain in our patients ranged from seconds to 10 minutes. The pain in six of these patients was neuropathic in nature, whilst in two it was nociceptive. One patient diagnosed with migraine without aura experienced pain with allodynic features; furthermore, the presence of frequent migraine attacks supports a distinct process of central sensitisation (7).

The differential diagnosis of nasal pain may involve a wide range of etiologies, whether of local or central origin, and may be due to either spontaneous or traumatic causes. In our seven cases, an idiopathic etiology was considered the most likely cause, given the absence of a history of trauma and the normal results of the paranasal CT scan. Taking into account that there may be patients whose imaging remains normal following trauma, the failure of the pain to resolve with intranasal lidocaine application supported the view that the pain originated centrally rather than peripherally. One of our patients, however, had a burning pain that began several weeks after a trauma sustained three years prior, and unlike our other patients, this pain had responded to intranasal lidocaine. The mean VAS score was 8,16 ±1,18 pre-procedure, and was recorded as 1.96±1.12 at week 4 and 2.00±1.07 at week 12 post-procedure. A significant reduction in post-procedure VAS scores was observed (paired t-test, p<0.001). Furthermore, a reduction in analgesic dosage was achieved in 75% of patients, whilst in 25% of patients, medication could be discontinued entirely.

Table 1.VAS score.

	Pre-procedure	Week 4 Post-Procedure	Week 12 Post-Procedure	p value
VAS	8,16 ±1,18	1.96±1.12	2.00±1.07	<0,001

VAS: *visual analogue scale*

†Mean ± standard deviation.

Table 2. Analgesic use.

Medication	Pre-procedural use, n	Post-procedural use, n	McNemar p value	Wilcoxon p value for dose change	Comment
Amitriptyline	2	1	1.000	0.500	Discontinued in 1 patient; dose reduced in 1 patient
Duloxetine	2	2	1.000	1.000	Number of users unchanged; dose reduced in 1 patient
Gabapentin	2	2	1.000	0.500	Number of users unchanged; dose reduced in both patients
Pregabalin	3	1	0.500	0.250	Discontinued in 2 patients; dose reduced in 1 patient
Tramadol	1	0	1.000	1.000	Completely discontinued in the only user

DISCUSSION AND CONCLUSION

In line with the literature, our patients' pain was confined to the cutaneous area innervated by the external nasal nerve; this distribution did not exhibit the typical topographical features of a non-traumatic neuralgia affecting a single terminal branch of the trigeminal nerve, such as the lacrimal, external nasal, infratrochlear or supraorbital nerves. Given the pain characteristics and the absence of autonomic symptoms in any of our patients, trigeminal autonomic cephalalgias and nasociliary neuralgia were also ruled out (9,10).

In a series of four cases presented by Todd Rozen, two of the reported cases responded to pregabalin (675 mg daily) and memantine (30 mg daily) at doses exceeding the recommended levels, whilst the other two patients did not respond to the same medications. In one patient, they reported that local anaesthetic injections into the external nasal nerve provided short-term but significant relief, and that subsequent radiofrequency procedures on the sphenopalatine ganglion and maxillary nerve provided long-term pain control. In one patient, they reported that bilateral supratrochlear, infraorbital and maxillary nerve blocks provided temporary but significant relief, and that optimal pain control was achieved by adding sphenopalatine ganglion rhizolysis (2). The difference in our study is that in some of our patients, we achieved a response to amitriptyline, which we initiated as pre-procedural medical treatment, and achieved treatment success without performing nerve ablation. Similarly, in one patient, we achieved pain control by combining external nasal nerve treatment with sphenopalatine ganglion PRF therapy.

In a study conducted by David G. Golding-Wood and colleagues, anterior ethmoidal nerve neurotomy was performed on two patients with post-traumatic external nasal neuralgia. Whilst the pain in both patients improved following surgery, one patient experienced permanent hypoesthesia, whilst the other developed temporary hypoesthesia around the nose

(1). The difference in our treatment was that we did not perform nerve ablation, and consequently, no hypoesthesia was observed. Similarly to this study, a statistically significant difference in VAS scores was found in the long-term follow-up of our patients.

The external nasal nerve block treatment administered by Héctor García-Moreno and colleagues to a 76-year-old patient with external nasal neuralgia and no history of trauma provided approximately three months of pain relief, independent of the duration of the local anaesthetic's effect. They achieved pain palliation through repeated injections (10). In our study, similarly to this article, pain control was achieved with external nasal nerve blocks administered to both one patient with a history of trauma and seven patients with central idiopathic neuralgia. Unlike that study, we aimed to further prolong the pain-free period by applying PRF to the external nasal nerve.

Marta Puma and colleagues, in a case involving a patient with post-traumatic persistent nasal pain who received topical steroid treatment in addition to systemic medication, achieved a significant reduction in pain, similar to our study (11). Onabotulinum toxin type A (BOTOX) was administered for the treatment of trigeminal neuralgia localised in the right external nasal region, as described in a case report published by Ngeow et al. (12). Although the patient had trigeminal neuralgia, the majority of the pain was localised in the external nasal region. Consequently, BOTOX was administered in high doses to the areas of intense pain; 60 units were injected into the right external nasal trigger point and 40 units into the right mental region, resulting in complete relief from pain in the right external nasal region for a period of one year (13). However, in another study, BOTOX treatment was attempted in two of the four reported cases of post-traumatic external nasal neuralgia, and no benefit was observed (14). In our study, pain relief was achieved in line with these reports; furthermore, PRF treatment carries a lower risk of side effects (such as difficulty swallowing, speaking and breathing, general weakness, ptosis, blurred vision, double vision, headache, temporary muscle weakness, etc.) compared to BOTOX applications. These cases highlight the difficulties in classifying and treating idiopathic non-traumatic nasal pain and support the notion that both neuropathic and non-neuropathic mechanisms may play a role in the persistence of the pain. Whether this pain represents a new entity or a variant of nasociliary neuralgia remains a matter of debate. In our view, external nasal neuralgia can be considered a specific form of neuralgia affecting one of the terminal branches of the trigeminal nerve. Due to the small number of cases reported in the literature, the treatment of such nasal pain syndromes is not standardised and must often be tailored to the individual. However, we believe that combined treatment approaches targeting different pain components are worth exploring, and that PRF treatment applied to the external nasal nerve as an invasive procedure for patients whose pain does not respond to medical treatments could be considered as an early therapeutic option.

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